

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.116, and in light the remarks that follow are respectfully requested.

Claims 1-30 are pending in the application.

By the above amendments, claims 1 and 17 are amended to address §112, second paragraph, issues.

Applicants thank the Examiner for acknowledging that claims 6 and 22 are allowable, except for being dependent upon a rejected base claim. In view of the foregoing amendments, and the following remarks, Applicants respectfully submit that all pending claims in the application are in condition for allowance.

Turning now to the Official Action, Claims 1-14 and 17 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. For at least the reasons that follow, withdrawal of the rejection is in order.

With respect to the rejection of claim 1 for use of the term "possibly," Applicants have amended claim 1 to obviate the rejection. That is, Applicants have replaced the word "possibly" with the word --optionally--. Clearly, this does not constitute a narrowing amendment, as the amendment simply replaces a word with a more suitable word having the same meaning. Applicants submit that this amendment obviates the rejection because the term "optionally" leaves no ambiguity as to which alternatives are covered by the claim. See M.P.E.P. §2173.05(h)(III). If the Examiner would prefer that an alternate term be used, Applicants would be willing to consider any suggested alternative.

With respect to the rejection of claims 1 and 17 for use of the term "substituted," Applicants have amended claims 1 and 17 to obviate the rejection. That is, Applicants have amended claims 1 and 17 by deleting the words "substituted or unsubstituted." Clearly, this amendment does not constitute a narrowing amendment, because the amendment deletes a limitation from the claim.

Accordingly, reconsideration and withdrawal of the rejection are in order.

Claims 17-21, 23 and 25-29 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Aharoni* (U.S. Patent No. 5,480,944). For at least the reasons that follow, withdrawal of the rejection is in order.

The present invention relates to a thermoplastic copolyamide, a composition comprising the thermoplastic copolyamide as a matrix, and a process for manufacturing the thermoplastic copolyamide. See specification at page 1 lines 3-7.

For example, independent claim 1, as amended above, sets forth a thermoplastic copolyamide resulting from the reaction between at least one polyfunctional monomer satisfying the following general formula I:



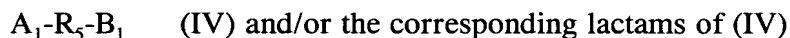
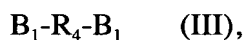
in which:

- n is an integer greater than or equal to 2,
- R_1 , R_2 may be identical or different and represent a covalent bond or an aliphatic, arylaliphatic, aromatic or alkylaromatic hydrocarbon radical,
- R is a linear or branched aliphatic radical, a cycloaliphatic radical, an aromatic radical, or a polymeric chain,

- A represents an amine or amine salt functional group, or an acid, ester, acid halide or amide functional group,
- B represents an amine or amine salt functional group when A is an acid, ester, acid halide or amide functional group, or B is an acid, ester, acid halide or amide function group when A is an amine or amine salt functional group,

and at least one bifunctional monomer of the following formulae II to IV, and optionally, a monofunctional monomer of the following formulae V or VI; or a prepolymer obtained from at least one bifunctional monomer of the following formulae II to IV and, optionally, at least one monofunctional monomer of the following formulae V or VI,

- the bifunctional monomers satisfying the following general formulae:



- the monofunctional monomers satisfying the following general formulae:



in which

- A_1 , B_1 may be identical or different and represent an acid, ester or acid chloride functional group, an amine functional group or an amine salt,

- R₃, R₄, R₅ may be identical or different and represent linear or branched alkyl hydrocarbon radicals or cycloaliphatic radicals optionally including unsaturated groups,
- R₆, R₇ may be identical or different and represent, aromatic, linear or branched, alkyl hydrocarbon radicals or alkylaryl arylalkyl or cycloaliphatic radicals optionally including unsaturated groups.

Aharoni relates to interpenetrating blends comprising a branched fractal three dimensional polymer (FPs) species which comprises aromatic recurring units having inert or reactive moieties on the exterior thereof having linear polymeric chains passing through and interpenetrated with the fractal polymer (FR). *Aharoni* further relates to polymeric composites comprising a polymer matrix having dispersed therein the interpenetrating polymeric blends of the disclosed invention, and to articles of manufacture formed from said blends and polymeric composites. See *Aharoni* at column 1, lines 5 to 17.

It is well established that in order to demonstrate anticipation under §102(b), each element of the claim in issue must be found, either expressly described or under principles of inherency, in a single prior art reference. Kalman v. Kimberly-Clarke Corp., 218 USPQ 789 (Fed. Cir. 1983). That is not the case here.

Aharoni does not disclose or suggest each feature of the presently claimed invention. For example, *Aharoni* does not disclose or fairly suggest the polyamide of the presently claimed invention. That is, the thermoplastic copolyamide of the presently claimed invention has a random-tree type structure that results from reaction between at

least one polyfunctional monomer of formula (I) with bifunctional monomers and optionally with monofunctional monomers. The polyfunctional monomer of the presently claimed invention comprises at least three amine and/or acid functional groups and comprises **both** amine **and** acid functional groups.

In contrast, *Aharoni* discloses a blend comprising linear polyamide polymers and an aromatic fractal polymer comprising one or two aromatic nuclei which comprise at least three amine **or** acid functional groups. For example, at column 2, lines 23-24 and at claim 1, lines 41-42, *Aharoni* discloses that a and b are different and are integers equal to 0, or between 3 and 6, with the proviso that a or b is 0. In other words, the disclosed blend includes at least three amine **or** acid function groups, but not both.

Accordingly, Applicants submit that the blend of *Aharoni* comprising an aromatic nucleus comprising at least three amine **or** three acid functional groups differs substantially from the copolyamide of the presently claimed invention which results from a reaction involving a polyfunctional monomer that comprises **both** an amine **and** acid functional groups.

Additionally, independent claim 17 and dependent claim 3 further define the copolyamide of the presently claimed invention as having a molar ratio R of multifunctional monomers to the sum of bifunctional monomers and monofunctional monomers of between 0.01 and 5. In addition to failing to disclose or fairly suggest a copolyamide having a structure similar to the presently claimed invention, *Aharoni* also fails to disclose or fairly suggest a copolyamide having a percent molar ratio of polyfunctional monomers to the sum of difunctional and monofunctional monomers of between 0.01% and 5%.

For example, if one were to assume that the branching monomer of *Aharoni* corresponds to the polyfunctional monomer of the invention (formula I) and the extension monomeric unit of *Aharoni* corresponds to the difunctional monomer of the presently claimed invention (formulae II, III and IV), one can readily see that the percent mole ratio of *Aharoni* does not correspond to that of the presently claimed invention. That is, even though *Aharoni* discloses at column 7, line 53 to column 8, line 7, that the mole percent of branching monomers is from 0 to 100%, based on the total moles of branching monomers and extension monomeric units, *Aharoni* discloses that the mole percent of branching monomers is preferably from 40 to 75%, based on the total moles of branching monomers and extension monomeric units. Thus, the mole quantity of extension monomeric units must preferably be from 60% to 25%. Consequently, Applicants submit that *Aharoni* discloses that the preferred percent molar ratio is from $(40/60) \times 100$, or 66%, to $(75/25) \times 100$, or 300%.

Furthermore, the Examples of *Aharoni* disclose a percent molar ratio of 100%. For instance, Example I.I discloses a polyfunctional monomer, corresponding to 3, 5-diaminobenzoic acid, in a quantity of 0.16 mole. Additionally, the disclosed difunctional monomer, corresponding to 4-aminobenzoic acid, is present in a quantity of 0.16 mole. Thus, the percent molar ratio R in Example I.I is equal to $(0.16/0.16) \times 100$ or 100%. Similarly, Example I.II discloses a polyfunctional monomer, corresponding to 5-aminoisophthalic acid, in a quantity of 0.1 mole. Example I.II further discloses a difunctional monomer, corresponding to 4-aminobenzoic acid, in a quantity of 0.1 mole. Thus, the percent molar ratio R in Example I.II equals $(0.1/0.1) \times 100$ or 100%. In

addition, Example II discloses a polyfunctional monomer, corresponding to 3, 5-diaminobenzoic acid, in a quantity of 0.1 mole and a difunctional monomer, corresponding to 4-aminobenzoic acid, in a quantity of 0.1 mole. Thus, the percent molar ratio R in Example II is also equal to $(0.1/0.1) \times 100$ or 100%.

Accordingly, Applicants submit that even though *Aharoni* discloses a very broad range of 0 to 100%, *Aharoni* cannot be reasonably considered to anticipate the much narrower range of the presently claimed invention because *Aharoni* clearly discloses a preferred ratio of 66% to 300% that is substantially greater than the presently claimed ratio. The lack of anticipation is further supported by the fact that the Examples of *Aharoni* disclose a molar ratio of 100%. Thus, Applicants respectfully submit that the claimed percent molar ratio of 0.01% to 5% clearly is not anticipated by the disclosure of *Aharoni* because *Aharoni* does not disclose the claimed narrow range with "sufficient specificity" to constitute an anticipation of the claims. See M.P.E.P. §2131.03.

For at least these reasons, the presently claimed invention is not anticipated by *Aharoni*. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 24 and 30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Aharoni* in view of *Fisch* (U.S. Patent No. 5,760,163). For at least the reasons that follow, withdrawal of the rejection is in order.

For at least all of the reasons discussed above, Applicants submit that the presently claimed invention would not have been obvious over the disclosure of *Aharoni*. That is, *Aharoni* fails to disclose or fairly suggest the structure of the presently claimed, invention

comprising **both** amine **and** acid functional groups as set forth, for example, in independent claim 17, from which claims 24 and 30 depend. Additionally, *Aharoni* fails to disclose or fairly suggest a copolyamide wherein the percent molar ratio R of the polyfunctional monomers to the sum of the difunctional monomers and monofunctional monomers is between 0.0% and 5% as set forth, for example, in independent claim 17, from which claims 24 and 30 depend. That is, in addition to failing to disclose the claimed narrow range with "sufficient specificity," *Aharoni* also fails to recognize the unexpected results achieved within the claimed narrow range. In particular, nowhere does *Aharoni* disclose or suggest that the claimed narrow range should, or ever could, be used instead of the much broader disclosed range to obtain a copolyamide having superior high melt viscosity and mechanical properties at least equivalent to those of a corresponding linear polyamide. See M.P.E.P. §2131.03 and specification at page 5, line 24 to page 6, line 4.

Fisch fails to overcome the above deficiencies of *Aharoni*. *Fisch* relates to an improved process for preparing branched polyamides, in particular those having a high molecular weight. See *Fisch* at column 1, lines 5-7.

Fisch does not disclose or fairly suggest each feature of the presently claimed invention. For example, *Fisch* fails to disclose or fairly suggest a copolyamide resulting from a reaction involving a polyfunctional monomer of the formula (I) which comprises **both** amine **and** acid functional groups. Additionally, *Fisch* fails to disclose or fairly suggest a copolyamide resulting from a reaction wherein a molar ratio R of multifunctional monomers of formula (I) to a sum of bifunctional monomers of formulae (II, III and IV)

and monofunctional monomers of formulae (V and VI) is between 0.01 and 5 as set forth, for example, in independent claim 17, from which claims 24 and 30 depend.

For at least these reasons, the presently claimed invention would not have been obvious over *Aharoni* in view of *Fisch*. Accordingly, reconsideration and withdrawal of the rejection are in order.

Claims 1-5 and 7-9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Aharoni* in view of *Meyer* (U.S. Patent No. 4,255,560). For at least the reasons that follow, withdrawal of the rejection is in order.

For all of the reasons discussed above, the presently claimed invention would not have been obvious over *Aharoni*. That is, *Aharoni* fails to disclose or fairly suggest a copolyamide resulting from the reaction of a polyfunctional monomer of formula I comprising **both** amine **and** acid functional groups as set forth, for example, in independent claim 1, from which claims 2-5 and 7 and 9 depend.

Meyer relates to thermoplastically formable copolyamides having improved fluidity and improved processability. See *Meyer* at column 1, lines 5-7.

Meyer fails to overcome the above deficiencies of *Aharoni*. That is, like *Aharoni*, *Meyer* fails to disclose or fairly suggest a copolyamide resulting from the reaction of at least one polyfunctional monomer of the formula I and at least one bifunctional monomer of formulae II to IV and optionally at least one monofunctional monomer of the formulae V or VI, wherein the polyfunctional monomer of formula I includes **both** amine **and** acid functional groups.

For at least these reasons, the presently claimed invention would not have been obvious over *Aharoni* in view of *Meyer*. Accordingly, reconsideration and withdrawal of the rejection are in order.

Claims 10-14 stand rejected under 35 U.S.C. §103(a) over *Aharoni* in view of *Meyer* and further in view of *Fisch*. For at least the reasons that follow, withdrawal of the rejection is in order.

For at least all of the reasons discussed above, the presently claimed invention would not have been obvious over *Aharoni* in view of *Meyer*. That is, as explained above, neither *Aharoni*, by itself, or in combination with *Meyer* discloses or fairly suggests a copolyamide resulting from the reaction of at least one polyfunctional monomer (I) with at least one bifunctional monomer (II to IV) and optionally at least one monofunctional monomer (V to VI), wherein the polyfunctional monomer I includes **both** amine **and** acid functional groups.

Fisch fails to overcome the above deficiencies of *Aharoni* and *Meyer*. That is, as explained above, *Fisch* also fails to disclose or fairly suggest a copolyamide resulting from a reaction involving at least one polyfunctional monomer of the general formula (I) wherein the polyfunctional monomer comprises **both** amine **and** acid functional groups, as set forth, for example, in independent claim 1, from which claims 10-14 depend.


For at least these reasons, the presently claimed invention would not have been obvious over *Aharoni* in view of *Meyer*, and further in view of *Fisch*. Accordingly, reconsideration and withdrawal of the rejection are in order.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at his earliest convenience.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: 

Martin A. Bruehs
Registration No. 45,635

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

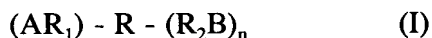
Date: June 17, 2002



Attachment to Amendment dated June 17, 2002

Marked-up Claim 1 and 17

1. (Thrice Amended) Thermoplastic copolyamide resulting from the reaction between at least one polyfunctional monomer satisfying the following general formula I:

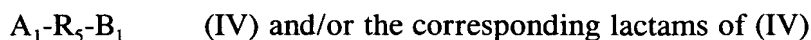


in which:

- n is an integer greater than or equal to 2,
- R_1 , R_2 may be identical or different and represent a covalent bond or an aliphatic, arylaliphatic, aromatic or alkylaromatic hydrocarbon radical,
- R is a linear or branched aliphatic radical, a cycloaliphatic radical, an aromatic radical, or a polymeric chain,
- A represents an amine or amine salt functional group, or an acid, ester, acid halide or amide functional group,
- B represents an amine or amine salt functional group when A is an acid, ester, acid halide or amide functional group, or B is an acid, ester, acid halide or amide function group when A is an amine or amine salt functional group,

and at least one bifunctional monomer of the following formulae II to IV, and optionally, a monofunctional monomer of the following formulae V or VI; or a prepolymer obtained from at least one bifunctional monomer of the following formulae II to IV and, optionally, at least one monofunctional monomer of the following formulae V or VI,

- the bifunctional monomers satisfying the following general formulae:



- the monofunctional monomers satisfying the following general formulae:



RECEIVED
JUN 19 2002
TECHNOLOGY CENTER

Attachment to Amendment dated June 17, 2002

Marked-up Claim 1 and 17

R_7-A_1 (VI)

in which

- A_1 , B_1 may be identical or different and represent an acid, ester or acid chloride functional group, an amine functional group or an amine salt,
- R_3 , R_4 , R_5 may be identical or different and represent linear or branched alkyl hydrocarbon radicals or cycloaliphatic radicals [possibly] ~~optionally~~ including unsaturated groups,
- R_6 , R_7 may be identical or different and represent [substituted or unsubstituted,] aromatic, linear or branched, alkyl hydrocarbon radicals or alkylaryl arylalkyl or cycloaliphatic radicals optionally including unsaturated groups.

17. (Amended) Thermoplastic copolyamide resulting from the reaction between at least one polyfunctional monomer satisfying the following general formula I:

$(AR_1)-R-(R_2B)_n$ (I)

in which:

- n is an integer greater than or equal to 2,
- R_1 , R_2 may be identical or different and represent a covalent bond or an aliphatic, arylaliphatic, aromatic or alkylaromatic hydrocarbon radical,
- R is a linear or branched aliphatic radical, cycloaliphatic radical, an aromatic radical, or a polymeric chain,
- A represents an amine or amine salt functional group, or an acid, ester, acid halide or amide functional group,

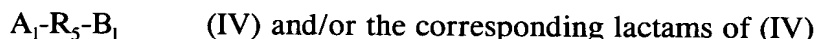
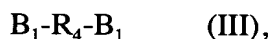
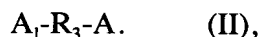
Attachment to Amendment dated June 17, 2002

Marked-up Claim 1 and 17

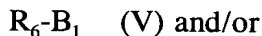
- B represents an amine or amine salt functional group when
A is an acid, ester, acid halide or amide functional group, or
B is an acid, ester, acid halide or amide functional group
when A is an amine or amine salt functional group,

and at least one bifunctional monomer of the following formulae II to IV and optionally, a monofunctional monomer of the following formulae V or VI; or a prepolymer obtained from at least one bifunctional monomer of the following formulae II to IV and optionally, at least one monofunctional monomer of the following formulae V or VI,

- the bifunctional monomers satisfying the following general formulae:



- the monofunctional monomers satisfying the following general formulae;



in which

- A_1, B_1 may be identical or different and represent an acid, ester or acid chloride functional group, an amine functional group or an amine salt,
- R_3, R_4, R_5, R_6, R_7 represent [substituted or unsubstituted,] aromatic, linear or branched, alkyl hydrocarbon radicals or alkylaryl, arylalkyl or cycloaliphatic radicals optionally including unsaturated groups;

wherein a molar ratio of the multifunctional monomers of formula I to a sum of the difunctional monomers of formulae II, III, IV and monofunctional monomers of formulae V and VI is between 0.01 and 5.